

PATENT CLAIMS

What is claimed is:

1. A plate heat exchanger comprising:

a plurality of partition plates arranged (i) to form a plate block or a plate stack and (ii) to delimit, in alternating directions, layers of flow channels between adjacent partition plates within said plurality of partition plates; wherein

a first partition plate comprises:

(a) a first main side;

(b) a second main side;

(c) a first solid edge which projects out of the plane of at least one of said main sides; and

(d) a second solid edge, opposite said first solid edge, which projects out of the plane of the same main side as and in the same direction as said first solid edge;

a second partition plate comprises:

(a) a first main side;

(b) a second main side;

(c) a first solid edge which projects out of the plane of at least one of said main sides; and

(d) a second solid edge, opposite said first solid edge, which projects out of the plane of the same main side as and in the same direction as said first solid edge, said second partition plate being joined to said first partition plate in a fluid-tight manner along said first and second solid edges of said first partition plate and spaced apart from said first partition plate by said first and said second solid edges of said first partition plate, thereby defining a flow channel layer between said

first partition plate and said second partition plate; and

wherein each of said solid edges is on the partition plate surface,

wherein said first partition plate further comprises:

- (a) a third solid edge which projects out of the plane of at least one of said main sides in a direction opposite from said first solid edge; and
- (b) a fourth solid edge, opposite said third solid edge, which projects out of the plane of the same side as and in the same direction as said third solid edge.

2. A plate heat exchanger comprising:

a plurality of partition plates arranged (i) to form a plate block or a plate stack and (ii) to delimit, in alternating directions, layers of flow channels between adjacent partition plates within said plurality of partition plates; wherein

a first partition plate comprises:

- (a) a first main side;
- (b) a second main side;
- (c) a first solid edge which projects out of the plane of at least one of said main sides; and
- (d) a second solid edge, opposite said first solid edge, which projects out of the plane of the same main side as and in the same direction as said first solid edge;

a second partition plate comprises:

- (a) a first main side;
- (b) a second main side;
- (c) a first solid edge which projects out of the plane of at least one of said main sides; and
- (d) a second solid edge, opposite said first solid edge, which projects out of the plane of the same main side as and in the same

direction as said first solid edge, said second partition plate being joined to said first partition plate in a fluid-tight manner along said first and second solid edges of said first partition plate and spaced apart from said first partition plate by said first and said second solid edges of said first partition plate, thereby defining a flow channel layer between said first partition plate and said second partition plate; and

wherein each of said solid edges is on the partition plate surface, wherein said plurality of partition plates comprise quadrilateral partition plates having solid edges arranged on both sides and wherein said plurality of partition plates are interleaved such that adjacent partition plates are rotated through 90° or tilted through 180° relative to one another.

3. A plate heat exchanger according to claim 1, further comprising manifolds attached to lateral sides of said plate block.
4. A plate heat exchanger according to claim 1, wherein each of said plurality of plates is identical.
5. An motor vehicle power system comprising a heat exchanger according to claim 1.
6. A fuel cell system comprising a fuel cell and at least one heat exchanger, wherein the heat exchanger comprises a plate heat exchanger as defined by claim 1.
7. A plate heat exchanger comprising:
a plurality of partition plates arranged in a stack,
wherein each partition plate comprises
(a) a center portion;

(b) a first solid edge region having a thickness greater than a thickness of said center portion; and

(c) a second solid edge region, opposite said first edge region, having a thickness greater than a thickness of said center portion; and

wherein each of said solid edge regions is on the partition plate surface;

wherein each plate is joined to an adjacent plate along said first solid edge region and said second solid edge region thereby defining a flow channel between each plate and an adjacent plate; and

wherein first, second and third successive plates within said stack are each arranged at an angle of 90° relative to a previous partition plate thereby defining a first flow channel extending in a first direction, between the first and second plates, and a second flow channel extending in a second direction, between the second and third plates,.

8. A plate heat exchanger according to claim 7, wherein each of said plurality of plates is identical.

9. A plate heat exchanger comprising:

a plurality of partition plates arranged in a stack,

wherein each partition plate comprises

(a) a center portion;

(b) a first solid edge region having a thickness greater than a thickness of said center portion; and

(c) a second solid edge region, opposite said first solid edge region, having a thickness greater than a thickness of said center portion; and

wherein each of said solid edge regions is on a first one of the partition plate surfaces;

wherein each plate is joined to an adjacent plate along said first solid edge region and said second solid edge region thereby defining a flow channel between each plate and an adjacent plate; and

wherein successive plates within said stack are arranged at an angle of 90° relative to a previous partition plate thereby defining flow channels in a first direction and a second direction, wherein each partition plate further comprises:

(b) a third solid edge region having a thickness greater than a thickness of said center portion and being located on a second one of the plate surfaces; and

(c) a fourth solid edge region, opposite said third solid edge region, having a thickness greater than a thickness of said center portion and being located on the same side of said plate as the third solid edge region.

10. A plate heat exchanger according to claim 1, wherein said plates comprise a metallic sheet material.

11. A plate heat exchanger comprising:

a plurality of partition plates arranged (i) to form a plate block or a plate stack and (ii) to delimit, in alternating directions, layers of flow channels between adjacent partition plates within said plurality of partition plates; wherein

a first partition plate comprises:

(a) a first main side;

(b) a second main side;

(c) a first solid edge which projects out of the plane of at least one of said main sides; and

(d) a second solid edge, opposite said first solid edge, which projects out of the plane of the same main side as and in the same

direction as said first solid edge;

a second partition plate comprises:

(a) a first main side;

(b) a second main side;

(c) a first solid edge which projects out of the plane of at least one of said main sides; and

(d) a second solid edge, opposite said first solid edge, which projects out of the plane of the same main side as and in the same direction as said first solid edge, said second partition plate being joined to said first partition plate in a fluid-tight manner along said first and second solid edges of said first partition plate and spaced apart from said first partition plate by said first and said second solid edges of said first partition plate, thereby defining a flow channel layer between said first partition plate and said second partition plate; and

wherein each of said solid edges is on the partition plate surface, wherein said plate block or plate stack comprises one of said first partition plates having one of said second partition plates being joined to both the first and the second main sides of said first partition plate in a fluid-tight manner along said first and second solid edges of said first or said second partition plate, and each second partition plate being spaced apart from said first partition plate by said first and said second solid edges, thereby defining a flow channel layer between said first partition plate and each of said second partition plates.

12. A plate heat exchanger according to claim 1, wherein each flow channel is separated from its adjacent flow channel(s) by only a single partition plate.

13. A plate heat exchanger according to claim 2, wherein each flow channel is separated from its adjacent flow channel(s) by only a single partition plate.